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SYNOPSIS

OF THE

VEGETABLE PRODUCTS

OF

NORWAY

BY

Dr. F. C. SCHÜBELER.

TRANSLATED FROM THE M. S.

BY

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INTRODUCTORY REMARKS.

At the request of the Central Committee appointed for the Arrangement of the Norwegian Contributions to the Great International Exhibition in London, 1862, I have compiled the following extracts taken from a Treatise on the Vegetable Productions of Norway,[1] lately published by me, and printed at the expense of the Royal Norwegian University.

The accompanying pages, printed at the expense of the Norwegian Government, are intended to serve as a guide to the Vegetable Products of Norway there exhibited.

Norway, which forms the north western part of the Scandinavian Peninsula, lies between 58° and 71° N. Lat. Its greatest length from Cape Lindesnæs in the south, to the North Cape on the Arctic Ocean is 900 miles.[2] Its superficial area may be estimated at about 121,800 sq. miles, — half of which is situated at an altitude of more than 2000 feet above the sea, while $\frac{1}{38}$,th or 3,200 sq. miles, lies within the limits of perpetual snow.

The altitudes at which snow never melts in the accompanying latitudes are as follows:

			Feet above the sea.
In lat.	61°	Sulutind	5,500.
—	62½°	Dovre	5,400.
—	67°	Sulitjelma	3,800.
—	70°	N. Cape	2,400.

[1] Die Culturpflanzen Norwegens beobachtet von Dr. F. C. Schübeler, mit einem Anhange über die altnorwegische Landwirthschaft. Herausgegeben auf Veranlassung des academischen Collegiums, als Universitäts-Program für das 1ste Semester 1862, mit einem Vorwort von Chr. Boeck, Professor der Physiologie. Mit Karte, Tabellen und Planchen. Christiania 1862. 197 P. 4to.

[2] English measure is used throughout.

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A glance at the accompanying map will show that Norway is, properly, a mountainous country, in which the mountains form the most prominent feature, while the valleys or lowlands occupy but a subordinate part; and even in those parts which have a lesser altitude than 2,000 feet, the same proportion is found to exist, though on a smaller scale.

Towards the frontiers of Norway and Sweden there extends a mass of mountains, from the sixty ninth parallel of latitude southwards, which though, strictly speaking, not a continuous chain must yet be considered to be a mountain range, whose average altitude is 3,000 feet, though this limit is occasionally exceeded. A little to the south of latitude 62°, these mountain ranges begin gradually to decrease in height, so that in the southern part of Norway is to be found, comparatively speaking, a considerable tract of lowland. At lat. 63° they first take a westerly and then a southerly direction till lat. 59°. In this part of the country traces of a continuous chain may here and there be observed, which should, however, with more propriety, perhaps, be termed an extensive plateau, with occasional peaks or ridges rising to the height of 8,000—9,000 feet above the sea. This plateau is of a somewhat undulatory form, having a breadth of 50—70 miles, but a greater length. As far as the eye can reach over these desolate wilds, the home of the wild reindeer, no traces of vegetation can be perceived, with the exception of the reindeer moss (*Cladonia rangiferina*), and other lichens of a similar nature, whose yellow tint imparts a melancholy appearance, and a depressing uniformity to the surrounding landscape. It is in this part of the country, viz. between lat. 60° and 62°, that the highest and wildest mountainous districts, and most of the glaciers are to be found.

As may be seen on the map, the valleys in the south-east of Norway run from north to south, and are frequently so narrow that the river, formed at the bottom by the mountain streams, occupies the principal part of them. On the western coast, however, the sea, in many places, makes deep indentations into the interior from west to east, thus forming firths or Fjords, as they are termed; which, like many of the valleys lying more to the east, may be considered as crevices, or fissures in the mountain mass.

The principal geological formations in the mountains of Norway are granite, gneiss, mica-slate and quartzite. These exercise great influence, not only, on the external formation of the country, but also upon its fertility. In some places, especially towards the S. E., as for instance in the districts adjacent to the Mjøsen Lake, the environs of Christiania, Skien &c., various kinds of slate and limestone are met with, and here the vegetation is found to differ in a very remarkable degree from that of those parts where gneiss, and the rocks allied to it, predominate. At different places, and especially in the S. E., where Norway and Sweden adjoin, the sea has in ante-historical ages deposited a considerable quantity of clay, which forms the substratum of the tillable land.

The greatest part of the country, therefore, consists of immense mountainous tracts intersected in different directions by deep valleys. The bottom and the sloping sides of these are adapted for the abode of man; but it is extremely rare to find human habitations, at least of a stationary character, at higher altitudes than 2000 feet; and even the "Sæters", where the people resort for a couple of months in the summer with their cattle, are seldom above 3,000 feet over the surface of the sea.

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Norway abounds in lakes, mostly of an inconsiderable size, and often lying at great altitudes above the sea, as

	in length		feet above the sea
Gjendin	11 miles	. . . . .	3,270
Bygdin	15 —	. . . . .	3,575

both in lat. 61½°. From several of these, rivers take their rise, and flow in totally opposite directions. The most remarkable instance is to be found in Lessjøværk's lake, lat. 62°. This lake is 7 miles long, and 2,050 feet above the sea, and is the source of two rivers, — the Logen flowing to the south, and the Rauma to the north.

The whole country abounds in morasses, many of which are capable of being reclaimed for agricultural purposes, but which, in their present state, have an injurious effect upon the climate, and render the cultivation of corn in their immediate neighbourhood, a matter of extreme uncertainty.

In the Diocese or "Stift" of Christiania alone, which comprises about ¼ of the superficial area of the whole country, there are not less than 1,156 sq. miles of marshy ground below the limit of corn, and 764 sq. miles above. During the last few years the people have been gradually awakening to the advantages of a rational system of agriculture, and have, in many places, by reclaiming marshy ground, and by applying a system of drainage to their cultivated lands, produced good results, which are becoming every year more and more apparent.

Although of late years the forests have been much reduced, yet they still occupy a considerable proportion of the surface of the country. They consist chiefly of Scotch fir, and Norwegian Spruce fir. Moreover, in some places in the south small woods of oak and beech are to be found; and in the north especially, birch woods are common; but these five sorts of trees are the only ones which appear in Norway in such quantities as to be said to constitute a wood. Other sorts appear only sporadically.

From the above remarks it will readily be seen that the tillable land in the whole of Norway cannot be extensive; and yet, on taking into consideration the superficial area of the country, one cannot but feel surprised to learn, that this tillable land does not exceed 1,060 sq. miles. Consequently, even in the most favourable years, Norway has still to import a great quantity of corn. What proportion of this area is arable land, and what pasture land (either natural or artificial) is, at present, impossible to state even approximately.

As Norway, as stated above, covers 13 degrees of latitude, it is very evident that there must be large room for changes of climate in a country of such extent. There are, however, other circumstances connected with this which must be taken into consideration. Proximity to the sea prevents extremes of heat and cold all along the extensive seaboard. On penetrating, however, for a very few miles into the interior, a most striking difference may be remarked. As an instance of this, the parish of Valle, in Sætersdal, may be adduced (the church lies 1,000 feet above the sea, lat. 59° 12′, long. 25° 11′ E. Ferro), where in summer the thermometer may show + 42°, and in winter the mercury may fall to − 35°.[1]

[1] The Centigrade thermometer is referred to.

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In the interior of the country the winters, generally speaking, are long and severe, while the summers are short and hot.

The accompanying table of Observations, taken at the Royal Norwegian Observatory in Christiania (59° 52′ 43″ lat. 28° 23′ 19″ long. E. Ferro), shows the state of the thermometer and barometer during the 24 years last past, together with the quantity of rain fallen.

Respecting other parts of the country, as far as meteorological observations have been made, the annexed table will show the state of the temperature.

	North Latitude.	Mean temperature for the whole year.	Mean temperature for the winter months.	Mean temperature for the summer months.
North Cape	71° 10′ 20″	+ 0,1	— 5	+ 6,25
Throndhjem	63° 25′ 45″	+ 4,25	— 4,75	+ 15,0
Bergen	60° 23′ 37″	+ 8,21	+ 2,21	+ 14,75
Ullensvang in Hardanger . .	60° 16′	+ 7,25	— 1,0	+ 15,16
Christiania	59° 54′ 43″	+ 5,37	— 5,0	+ 15,5

At the Alten copperworks in Finmarken (69° 57′ 30″ lat., 40° 41′ E. Ferro) the mean temperature, after eleven years observation, can be computed as follows:

January, — 7,490, February, — 8,957, March, — 5,993, April, — 0,695, May, + 4,525, June, + 9,418, July, + 13,113, August, + 13,254, September, + 7,298, October, + 0,341, November, — 4,033, December, — 5,619.

As may be anticipated from the configuration and situation of the country, the quantity of rain falling in different localities varies exceedingly. Thus, while but little rain falls in the eastern districts, the quantity that falls in some parts on the western coast is extraordinarily great. At Bergen the quantity of rain that falls during the whole year may be estimated at 85 inches, while at Christiania, taking the average of 20 years (1839—1858), it was 20,7 inches.

When, furthermore, it is borne in mind that the sea never freezes along the whole extent of the western and northern coasts, it will be perceived that Norway enjoys a far milder climate than any other country in the world under the same degree of latitude. The cause of this is, that the Gulf Stream, in its course towards the north, approaches or impinges on the northern coast under the sixty second parallel of latitude. It is by no means improbable that a smaller branch of this stream takes a southerly direction along the coast; but at all events, from a number of facts (which space will not allow me to introduce here) it is clear, that the Gulf Stream takes a northerly direction from this point of impact, and follows the line of coast at a greater or less distance to the Russian frontiers on the Arctic Ocean. From thence, it has been ascertained, that it flows into the White Sea, and afterwards, taking a bend towards Nova Zembla, touches the coast of Spitzbergen in lat. 80°. Whether it now loses itself in the Arctic Ocean, or mixes with the cold sea stream, which flows in a southerly direction between Iceland and Greenland, has not hitherto been ascertained.

The fact above alluded to is undoubtedly the cause, that the northern parts of Norway are not only habitable, but are also considered by many as agreeable places of residence. But there is also another circumstance which exercises great influence on the vegetation over

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the whole of Norway, and especially towards the north, viz. the long days, or, in other words, the continual light.[1]

Moreover during the short nights, the earth does not become so cooled as in more southern latitudes; vegetation therefore continues, night and day, without interruption. In other words, a lower and continuous degree of warmth produces the same effect in Norway that a higher temperature, interrupted by proportionally colder nights, produces in countries lying more to the south.

From investigations and observations I have made for several years, I may cite the following results.

The temperature of the atmosphere and of the soil decreases, as is well known, directly as the distance from the equator. Consequently, it might be premised that more time would be requisite for the development of a plant the further it is found towards the north. Yet corn and other plants will ripen under a much lower temperature, and in a much shorter time in Norway than in countries further towards the south; and even in Norway itself, a considerable difference in this respect may be observed, between the southern and northern districts.

Corn or other seeds brought from a southern to a northern climate require at first a longer time to ripen than the same species, which have been cultivated there for some time. But after the lapse of two or three years, the plants obtained from foreign seeds generally acquire the same ripening peculiarities as their corresponding species, which have been cultivated for a longer time in the country. And I have further remarked, that if seeds are brought from a higher to a much lower latitude, they will in the first (and perhaps also in the second) year ripen earlier than the corresponding plants of the same species, which belong to that lower latitude, though after a time they become similar in this respect.

So long as a plant is not cultivated further northwards than it is able to attain its full development, the seed increases in size and weight for the first 2—3 years, the nearer it approaches this limit; but, it diminishes in like manner, if cultivated several degrees further south. The greater the difference in latitude between the respective places, the more marked is this difference.

Again, the further north a plant is cultivated, under the above restriction, the more strongly does the pigment of the epidermis become developed. This peculiarity is very marked in several varieties of yellow peas, which become green when cultivated in high latitudes, and in white kidney beans with red spots or stripes, which get a more extended and more intense pigment deposit. But after the lapse of 1—2 years, and under a more southerly latitude, the seed loses this peculiarity.

In several plants also, the flowers assume an intenser colour; and the leaves of wild

[1] Under the seventieth parallel of latitude, in Finmarken, from May 24th till July 19th, the sun never sinks below the horizon. At Throndhjem, lat. 63° 25′ 45″, the sun rises at 1 hr. 50′ a. m. on June 1st, and sets at 10 hr. 13′ p. m.; and even at Christiania, lat. 59° 54′ 43″, when the sun rises 2 hr. 40′ a. m., and sets at 9 hr. 23′ p. m., it is so light, that for two or three weeks it is quite possible to read during the whole night, when the sky is entirely free from clouds.

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and cultivated trees are remarkable for the greater brightness and freshness of their verdure, than is the case in countries situated several degrees further south.

Those plants, whose roots, leaves, flowers, seeds or fruit contain some aromatic matter, e. g. the turnip-rooted celery, parsley, horse-radish, onion, lavender, coriander, strawberry, Gravenstein apple &c., develop this peculiarity to a very striking degree, the further they are found towards the north. Even an interval of three degrees of latitude can produce a remarkable difference in this respect; thus, the bird-cherry, mountain ash, lily-of-the-valley &c. are characterized for their stronger aromatic properties in the neighbourhood of Throndhjem, than in that of Christiania. A striking peculiarity may further be noticed in the case of those edible tree-fruits, which are cultivated partly for the sake of their aroma, and partly for the sweetness therewith combined, viz. that in proportion as their aromatic properties increase, their sweetness sensibly diminishes. And this may be particularly remarked, not only on comparing foreign and Norwegian fruits of the same species, but also in the same species when growing in different parts of the country, and indeed even in the same part, according as the summer season is warmer or colder. In average summers, different varieties of plums will usually ripen as far north as lat. 64°, and grapes growing against walls, at a little over lat. 61°, though, it must be allowed, they are very deficient in point of sweetness. But notwithstanding that most of our fruits have a sourish taste, yet this deficiency is counterbalanced by the agreeable flavour imparted to them by their increased aroma, as e. g. in strawberries and apples.

The phenomena above alluded to, viz. that plants, under a higher latitude and lower temperature, require a shorter time for development than in more southern climes — that the seed increases (comparatively speaking in no inconsiderable degree) both in size and in weight — that many of their organs receive a greater pigment-deposit — and also that their aromatic properties become more prominent, can, I think, only be explained by the great influence the long days have on the vegetation in the far north; and further, that it is this influence, in conjunction with the mild temperature produced by the Gulf Stream, that causes the phenomenon (the only instance on the whole earth) that oats will ripen as far north as lat. 69°, rye as 69½°, and barley as 70°, where also Scotch fir and birch may be found with stems 3 feet and 1 foot in diameter, respectively.

From observations made at Alten copper Works, W. Finmarken, (lat. 69° 57′ 30″) it has been ascertained that barley will grow 2½ inches, and peas 3 inches in the twenty four hours for several consecutive days. These circumstances are the more worthy of remark, when it is borne in mind that in Norway, agriculture and garden cultivation can be carried on under the same parallel of latitude, under which Victoria land, Disco Island, and Boothia Felix are situated.

Whether it is the heating or the actinic rays of the sun that here play the principal part, or whether it is both of these combined, or, whether it is due to other still unknown solar influences, must be left for future investigation to ascertain.

Certain is it, however, that light, in the general acceptation of the word, exercises an immense influence on the vegetation of Norway. Consequently, when after a rainy summer we have a poor harvest, the failure of the crops is not so much to be attributed to the greater

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amount of rain that fell (harvesting-time of course being excepted) as to over clouded skies, and a consequently lower degree of temperature.

It is a patent fact that, even among the highest authorities, differences of opinion exist with reference to the acclimatisation of plants. From experiments I have made in the Botanical Gardens in Christiania (which space will not allow here me to mention in detail)[1] it has been satisfactorily proved, that not only is acclimatisation possible, but that it can be accomplished in a comparatively short space of time.

After these preliminary remarks I purpose briefly to notice the most important of the trees and other vegetable products of Norway.

In my treatise above referred to, I have adopted the system of Endlicher, but in order to make the present survey more popular have determined, instead of following any botanical system, to classify the plants in four groups, viz.

I. Fruit Trees and Shrubs.
II. Forest and ornamental Trees and Shrubs.
III. Cereals.
IV. Other Plants cultivated for economical purposes.

I. FRUIT TREES AND SHRUBS.

Almond (Amygdalus communis *L.*). On the southeastern coast between lat. 58° and lat. 59¼°, almonds ripen as standards in warm summers. The largest specimen I have seen is in the town of Frederikshald (59° 7′), being 15 feet in height, and with a stem of 28—29 inches in circumference.

Apple. The Crab Apple (Pyrus Malus *L.*) grows wild in the low lands as far north as the neighbourhood of Throndhjem (lat. 63° 25′). Even in Romsdal, (lat. 62° 55′) specimens are found growing wild from 20—30 feet in height with stems of 2 feet in diameter. Cultivated apple trees grow as standards up to lat. 65° 10′; and the earlier sorts will undoubtedly ripen further north, as espaliers against walls. Beyond this degree of latitude scarcely any apple trees are to be found in any other place in the world. At present there are 346 known varieties of apple trees cultivated in Norway. Of late years I have discovered 13 new ones peculiar to Norway, many of which yield most excellent dessert fruit. The largest apple I have seen in Norway came from the little town of Mandal (lat. 58° 1′) and weighed 25⅛ ounces; and the greatest yield I have heard of one tree producing occurred in Hardanger, in the diocese or "Stift" of Bergen, it being 38—39 bushels.

[1] Vid. my treatise on „Die Culturpflanzen Norwegens."

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Apricot (Armeniaca vulgaris *Lam.*) is cultivated in several places, as, for instance, in Hardanger about lat. 60°, as a small standard, but usually against walls. In this way several varieties will ripen in average summers as far north as Sogne Fjord (lat. 61° 17′).

Bramble (Rubus fruticosus *L.* and other species) are found growing wild as far north as lat. 66°; but I am unable to state which species grows farthest north. As far as I am aware, none of those varieties, which are refined by cultivation in other countries, are grown here. The arctic bramble (R. arcticus *L.*) is found wild, especially in the northern districts (lat. 68°—69°). The delicate aromatic flavour of its fruit renders it worthy of cultivation.

Cherry. The wild cherry (Prunus avium *L.*) is found growing wild on the northern coast of the Sogne Fjord (lat. 61° 20′). When cultivated, the cherry tree will grow as a standard as far north as lat. 66°. At present there are 22 known varieties of sweet and sour cherries cultivated in Norway.

Chestnut, sweet or Spanish (Castanea vesca *Gärt.*) is found along the south coast as far as Christiania, where it ripens in warm summers.

Cloudberry (Rubus Chamæmorus *L.*) is to be found over the whole country on marshy places. Great quantities of this fruit come annually from Finmarken for sale in the southern districts of Norway.

Cornelian Cherry Tree (Cornus mascula *L.*) I have only seen cultivated in the vicinity of Christiania, where they may be found from 14—15 feet high, and with stems 1½ feet in circumference.

Cranberry (Vaccinium Oxycoccos *L.*), **Cowberry** (V. Vitis Idæa *L.*), **Bilberry** (V. Myrtillus *L.*) and **Bog Whortle Berry** (V. uliginosum *L.*) appear to grow wild over the whole country, but are no more an object of cultivation here than in other countries.

Currant. The red currant (Ribes rubrum *L.*) is generally to be found wild as far north as Finmarken, and even under the seventieth parallel of latitude produces annual shoots up to 20 inches in length. Finer varieties of red and white currants are cultivated as far north as Finmarken. The black currant (Ribes nigrum *L.*) is occasionally to be found growing wild in the lowlands in the south, and as far north as Romsdal (lat. 62° 55′). It is also found wild in Svanevig, E. Finmarken, close to the Russian frontier (lat. 69° 30′), where it will even ripen in warm summers. Cultivated varieties of this species will ripen in favourable summers in W. Finmarken (lat. 68° 49′).

Elder (Sambucus nigra *L.*) is probably only a naturalized straggler. When cultivated, it will grow as far north as lat. 64°. In Throndhjem (lat. 63° 25′) the fruit ripens in very warm summers.

Gooseberry (Ribes Grossularia *L.*) is found wild here and there in the lowlands up to lat. 63°. Finer varieties, when cultivated, will ripen as far north as lat. 66¼° at least.

Grape (Vitis vinifera *L.*). Many varieties are grown against walls in the south of Norway, and the fruit will ripen in average summers as far north as Sogne Fjord (lat. 61° 17′). The largest bunch that I have seen grown in this manner in Christiania weighed 1 ℔., and the largest yield from one vine amounted to 55 ℔s. In average summers the Isabella and Catawba grapes (Vitis Labrusca *L.*) will ripen against walls in Christiania.

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Hazel-nut (Corylus Avellana *L.*) grows wild as far north as lat. 66°. Finer varieties, as for instance the Cob nut, the Red and White Filbert &c., I have only met with in the south of Norway.

Medlar (Mespilus germanica *L.*) I have only found in places between lat. 58° and lat. 60°. Standards will ripen in average summers.

Mulberry (Morus alba & nigra *L.*) The white and black Mulberry both thrive in the vicinity of Christiania, but I have only met with the fruit of the latter sort ripe.

Peach (Persica vulgaris *DC.*) is only grown against walls in the southern districts; it will ripen as for north as Sognefjord (lat. 61° 17′).

Pear (Pyrus communis *L.*) The wild pear tree is not found in Norway. I know of 66 different varieties of the finer sorts cultivated in the country. At Throndhjem (63° 25′) the pear tree is occasionally cultivated as a standard, but is generally grown against walls. The largest yield I have heard of from one tree was from the "Bergamotte rouge" in Hardanger, it being 11—12 bushels.

Plum (Prunus domestica *L.*) is not found wild in Norway. Of the 22 varieties which I have known to be cultivated in the country some will ripen, as the Green Gage, both as standards and against walls, as far north as lat. 64°.

Quince (Cydonia vulgaris *Pers.*) is cultivated as a standard at some places on the south eastern coast between lat. 58° and lat. 60°; the fruit will ripen in warm summers. The largest ripe Quince I have seen, weighed a little over 8 ounces.

Raspberry (Rubus Idæus *L.*) is found growing wild over the whole country as far north as lat. 70°. The finer varieties as for instance Double-bearing, Fastolff, Red Antwerp, Yellow Antwerp &c., have not, I believe, been hitherto cultivated north of Throndhjem.

Straw-berry (Fragaria vesca *L.*) is to be found up to lat. 70°. How far the cultivated species and varieties extend towards the north, I cannot pronounce with any certainty; but many of them thrive admirably in the southern districts e. g. The Black Prince, Elton, British Queen, Princess Alice &c.

Walnut (Juglans regia *L.*) is by no means rare along the coast from Christiania to Throndhjem. It will ripen in average summers as far north as Sogne Fjord (lat. 61°); but beyond this degree of latitude the summer must be unusually warm for it to do so. The most northerly walnut tree in Norway (and probably in the world) stands in the Parsonage garden at Frosten (lat. 63° 35′) some few miles north of Throndhjem. This tree is about 50 years old, and is 26 feet high; its stem is 4 feet in circumference near the ground. In very warm summers it will bear ripe fruit, which I have seen myself. The largest walnut tree in Norway that I know of is some few miles south of Bergen (about lat. 60°). It is 58 feet high, and at a distance of 4 feet from the ground its stem measures 6½ feet round.

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II. FOREST AND ORNAMENTAL TREES AND SHRUBS.

Ailanthe (Ailanthus glandulosa *Desf.*) There are some young specimens in the Botanical gardens at Christiania which I have raised from seed; they are now about 6 feet high. Hitherto their tops have been frozen off during the winter.

Alder (Alnus glutinosa *Willd.*) grows wild in the low lands, and on the western coast, as far north as lat. 63°. The largest specimen that I know of is in the parish of Indvigen in the diocese of Bergen (lat. 61° 47′). It is about 40 feet in height, and is divided into three large branches each about 18 feet in circumference; between the ground and the fork the trunk measures forty feet in girth! The white Alder (A. incana *Willd.*) grows as far north as lat. 70° in Finmarken. On the mountains it grows at a greater altitude than the Scotch Fir, but at a less one than the Birch. I have observed 6 different species of this genus in gardens near Christiania.

Amelanchier ovalis *DC.*, **A. sanguinea** *DC.*, and **A. vulgaris** *Mœnch* are found in gardens and parks in the neighbourhood of Christiania.

American Arbor Vitæ (Thuja occidentalis *L.*) is found occasionally growing in gardens as far north as Throndhjem; it stands the winter very well. Near Christiania there are specimens of this tree 24—25 feet high, with stems measuring 20—21 inches in circumference, two feet from the ground.

Ampelopsis hederacea *Mchx.* or **Five-leaved Ivy** is not rare as an ornamental plant; as far north as Throndhjem it is not covered up during the winter. In the neighbourhood of Christiania it attains a height of 20—25 feet in a few years.

Ash (Fraxinus excelsior *L.*) grows wild in the low lands as far north as lat. 62½°. Under this latitude it will attain a height of 80 feet, and a circumference of rather more than 14½ feet round the trunk, measured 5 feet from the ground.

Ash-Berbery (Mahonia Aquifolium *Nutt.*) is found in gardens as far north as Christiania (lat. 60°). It is not covered up during the winter.

Aspen (Populus tremula *L.*) is very common as far north as lat. 70°, where its stem attains sometimes a diameter of 14 inches. The largest specimen in Norway is by the Sogne Fjord (lat. 61° 17′) its stem measures 16½ feet round, at a distance of four feet from the ground; and its crown has a diameter of 68 feet. On the mountains it grows at the same altitude as the Scotch Fir.

Bastard Indigo (Amorpha fruticosa *L.*) and two other species are cultivated near Christiania; but the tops are generally frozen off in the winter.

Bastard Mountain Ash (Sorbus hybrida *L.*) is found growing wild in the low lands, and along the western coast as far north as Throndhjem, at which place there is a specimen from 35—40 feet in height, the stem of which, measured breasthigh from the ground, is 4 feet 6 inches round. In Hardanger, in the diocese or "Stift" of Bergen it is usual to graft a peculiar sort of very fine pear, the name of which I cannot state with certainty, on the stock of this tree. This is done partly on trees growing wild in crevices of the rocks, or wherever else they may be

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found growing naturally, and partly on young stocks in gardens. The reason is, that in these districts there is so little tillable land, that it is quite necessary to use every available spot of ground; and also, because it has been plainly shown from experience that pears can in this way be much more advantageously cultivated on a sandier and lighter soil, than by using the common pearstocks for grafting.

Beam Tree (Sorbus Aria *Crtz.*) is found growing wild in the lowlands in different parts up to lat. 63½°, but is probably to be met with further north.

Beech (Fagus sylvatica *L.*) grows wild in several places in the south of Norway, where woods of this tree are to be found; as for instance in the vicinity of Laurvig between lat. 59° and 59½. The northern limit for the wild beech is some few miles north of Bergen; but when cultivated, it will thrive as far north as Throndhjem (lat. 63° 25′), where it will, as well as the purple beech (F. sylvatica purpurea *Ait.*), yield ripe fruit in average summers, and form annual shoots up to 20 inches in length.

Berberry (Berberis vulgaris *L.*) is found growing wild in several places in the south of Norway, having, in all probability, been originally introduced by the monks in the middle ages. It is cultivated in the vicinity of Throndhjem where its fruit will ripen. I have seen fourteen other species in gardens near Christiania.

Birch (Betula). Of those species which form large trees and woods it is probably Betula alba *Hartman*, which is most common in the low lands; and Betula glutinosa *Wallr.* (B. pubescens *Ehrh.*) which is found furthest north and highest up in the mountains, where the "Birch-limit" is reckoned by the appearance of this species. This limit, which is produced by local causes, may, with some few exceptions, be placed at the following altitudes above the sea:

	feet above the sea.
under lat. 61°	3750
— lat. 62°	2700
— lat. 63°	2400
— lat. 64°	2200
— lat. 65°	1800
— lat. 67°	1350
— lat. 68°	1100
— lat. 70°, 40′	850

As might be expected, the birch diminishes in size the further it grows to the north, but even under the seventieth parallel of latitude trees may be found ranging from 20—30 feet in height, and with stems, measured near the root, 18 inches in diameter.

Birch trees of 70 - 80 feet high, with stems from 9—18 feet in circumference are found in several places in Norway. These generally belong to that variety called the Weeping birch, whose delicate, hanging branches sometimes attain a length of 12—16 feet. A magnificent specimen may be seen at Slinde on the Sognefjord, said to be centuries old (vid. Woodcut on Cover). Dwarf Birch (Betula nana *L.*) grows everywhere in the Alpine

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regions, and is found at much higher altitudes than any other species. It is occasionally found also in the south of Norway in the low lands, at an altitude of 600 feet above the sea.

Bird-Cherry (Prunus Padus *L.*) grows over the whole country as far north as Finmarken, where the fruit ripens under lat. 70°. On the mountains its limit is intermediate to that of the Scotch fir and birch. At Laurdal Church in Thelemarken (lat. 59° 25′) there stands a tree 36 feet high, the stem of which, measured at breast-height from the ground, is 5½ feet in circumference; the crown has a diameter of 38—39 feet. I have met with eight foreign species of this genus in gardens near Christiania.

Birthwort, tube-flowered (Aristolochia Sipho *L'Herit.*) is met with occasionally as an ornamental plant as far north as Throndhjem, at which place it is not found to require protection during the winter.

Black Thorn Sloe (Prunus spinosa *L.*) is found growing wild along the southern and western coast as far north as lat. 60°. In the neighbourhood of Christiania, and probably also in other places, two varieties or species are found, which will be spoken of in another place.

Bladder-nut Tree (Staphylea pinnata *L.*) I have only met with in the neighbourhood of Christiania, where it attains a height of 8—10 feet, and where its fruit ripens.

Bladder Senna (Colutea arborescens *L.*) together with five other species is found in gardens round Christiania.

Box Thorn, the European (Lycium europæum *L.*) is found in a cultivated state in places in the south of Norway up to Christiania, where I have seen three different species.

Box Tree (Buxus sempervirens *L.*) is occasionally found in gardens as far north as lat. 60°. The largest specimen I have seen in Norway grows on the south coast (lat. 58° 22′), a few miles from Arendal. It is 6½ feet high, the crown 7½ feet in diameter, and the stem 15 inches in circumference.

Buckthorn (Rhamnus cathartica *L.*) grows wild in low lands, and as far north as lat. 60°. The Alder Buckthorn (R. Frangula *L.*), however, extends nearly to the Polar Circle. At Christiania I have seen twelve foreign species.

Carolina Allspice (Calycanthus floridus *L.*) I have only met with at the Naval Establishment in Horten (lat. 59° 25′ 30″).

Coronilla Emerus *L.* and **C. glauca** *L.* I have only met with at one place in Norway, viz. the little town of Mandal (lat. 58° 1′).

Currant (Ribes) In addition to the species mentioned above, the Mountain Currant (R. alpinum *L.*) grows wild as far north as Finmarken. I have met with 13 foreign species grown in gardens, as ornamental shrubs, up to Throndhjem.

Deutzia scabra *Thunb.* I have only observed near Christiania.

Dogwood (Cornus sanguinea *L.*) grows wild in low lands as far north as lat. 60°. I have met with four foreign species under cultivation.

Dwarf Almond (Amygdalus nana *L.*) is found growing in gardens in different places up to Christiania, at which place it can stand the winter without being covered up. The fruit ripens in average summers.

Elæagnus latifolia *L.* grows in gardens along the coast as far north as Throndhjem.

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Elm (Ulmus campestris *L.*) is common, and grows wild up to lat. 66°; it is found on the mountains between the limits of the Norway spruce fir and Scotch fir. Besides different varieties of this species, U. americana *L.* and U. suberosa *Ehrh.* are cultivated in the neighbourhood of Christiania.

False Acacia or **Locust Tree** (Robinia Pseudacacia *L.*) is found growing in sheltered places in gardens along the coast up to Throndhjem.

Ginkgo Tree (Salisburia adianthifolia *Sm.*) endures the winter at Christiania, without covering.

Green-weed (Genista). Besides the needle Green-weed (G. anglica *L.*) I have found 9 foreign species growing in gardens round Christiania.

Guelder-Rose (Viburnum Opulus *L.*) is found growing wild over the whole country up to lat. 69°; on the mountains it attains the same limit as the Norway spruce fir. The Snowball Tree (V. Op. roseum *Roem. & Schult.*) is found in gardens as far north as Finmarken (lat. 68° 35′). V. Lantana *L.* and V. dentatum *L.* are found in a cultivated state as far north as Throndhjem. V. edule *Pursh,* V. lantanoides *Mchx.* and V. Lentago *L.* are found in the neighbourhood of Christiania.

Hawthorn (Cratægus Oxyacantha *L.*) grows wild in low lands along the coast up to about lat. 63°, where specimens may be found from 8—10 feet high, with stems 6 inches in diameter. In a cultivated state it may be found at least as far north as Throndhjem. Round Christiania there are specimens 25 feet in height, with stems from 11½—12 inches in diameter. In the south of Norway I have found 23 different species, some of which, as C. Crus galli *L.*, grow as far north as Throndhjem.

Holly (Ilex Aquifolium *L.*) grows wild on the south-eastern and west coasts up to a little over lat. 62°. It thrives admirably in the neigbourhood of the sea along the west coast; thus, a few miles south of Bergen on the island of Stordø (lat. 59° 45′) there is a holly tree full 47 feet in height; a short distance above the ground the stem is divided into several branches, two of which have a diameter of 7—8 inches; below the fork, the stem measures 2 feet 9 inches in diameter. Under the above mentioned parallel of latitude, the holly is scarcely to be found in any other place in the world, either in a wild or in a cultivated state.

Honey Locust (Gleditschia triacanthos *L.*) I have not met with in any place in Norway except near Christiania, where it stands the winter well.

Honeysuckle or **Woodbine** (Lonicera Periclymenum *L.*) grows in the neigbourhood of the coast up to lat. 62½°; in a cultivated state it will grow at least as far north as Throndhjem. The upright Fly-Honeysuckle (L. Xylosteum *L.*) appears in similar places up to lat. 61½°. L. Caprifolium *L.* and L. tatarica *L.* are found in a cultivated state as far north as Throndhjem, at which place the latter species will attain a height of 8—9 feet, and yield ripe fruit. In the neighbourhood of Christiania I have noticed 11 different foreign species.

Hornbeam (Carpinus Betulus *L.*) is not found growing wild in Norway; it is found, however, in a cultivated state round about Christiania, where its seed ripens in average summers.

Horse-chestnut (Æsculus Hippocastanum *L.*) is common in a cultivated state near the coast as far north as Throndhjem, where its fruit ripens in average summers. Trees 60 feet

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high with stems 11 feet in circumference may be met with in the south of Norway — and trees 40 feet high, with stems 6½ feet in circumference are not uncommon in the neighbourhood of Throndhjem. Round Christiania there are also Æ. flava *Ait.* Æ. pallida *Willd.* Æ. Pavia *L.* and Æ. rubicunda *Lois.*

Hydrangea arborescens *L.* is found in different places growing in gardens as far north as Christiania, at which place it does not require winter covering. H. Hortensia *DC.* grows out of doors at Mandal (lat. 58° 1′), and flowers every summer, but must be covered up in the winter.

Ivy (Hedera Helix *L.*) grows wild on the south eastern and west coasts up to lat. 60° about; it is found in a cultivated state as far north as Throndhjem, where it does not require winter covering. In the southern parts of the country the wild ivy attains a tolerable size: thus, at Mandal, about 20 years ago, two very young plants were placed in the ground at a distance of 4 feet from each other under a perpendicular cliff. The stems have a diameter of 3½ and 5 inches respectively. The branches which have grown one within the other, now (1862) cover a superficial area of 49 feet by 33 feet.

Juniper (Juniperus communis *L.*) is found growing over the whole country as far north as Finmarken, and on the mountains up to the same limit as birch. The Juniper occasionally grows to a comparatively large size. I have before me a piece of the stem of a juniper tree from Throndhjem; it is 8½ feet long, and has a diameter of 7½ inches at the top end, and of 12½ inches near the root, where 300 concentric rings may be counted, and 60 concentric rings next to the bark in the last inch. The largest juniper tree in Norway grows in Haabel parish (lat. 59° 36′) some few miles south of Christiania; it is 25 feet in height, and has a stem of 8—9 feet high, after which it separates into five branches, one of which is 2 ft. 2½ in., three others 2 ft. 4 in., and the fifth 3 ft. 2 in. in circumference. At a distance of two feet above the ground the stem measures 7 ft. 3 in. in circumference; the crown has a diameter of 26 feet. Occasionally the Juniper assumes a pyramidal form like the cypress, for which I have hitherto been unable to assign a satisfactory reason.

Laburnum (Cytisus Laburnum *L.*) is found in gardens along the south coast up to lat. 60°. The Alpine or Scotch Laburnum, however, (Cytisus alpinus *Mill.*) extends as far north as Finmarken (lat. 68° 35′). The seed ripens as far north as Throndhjem at least, at which place I have seen trees 14 feet high, with stems measuring 19 inches in circumference. In gardens near Christiania I have observed 12 different species, besides the C. Alchingeri *Visiani.*

Larch (Pinus Larix *L.*) is found in a cultivated state at several places as far north as Throndhjem, at which place it has for many years propagated itself by self-sowing. The largest plantation in Norway is to be found near the little town of Mandal (lat 58° 1′) not far from Cape Lindesnæs, where 5,000 two years old larches mixed with Scotch fir were planted in 1805. In twenty years, many of the larches had attained a height of more than 50 feet; for in 1825, a ladder, 50 feet long, was made from two of them! I have now lying before me a transverse section from the trunk of a larch at Mandal, which was 50 feet high; it has 47 concentric rings, and is 22 inches in diameter.

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Lilac (Syringa vulgaris *L.*) one of the most favourite of our ornamental trees grows as far north as Finmarken under lat. 68° 49′. S. persica *L.*, S. chinensis *Willd.* and S. Josikæa *Jacq.* grow as far north as Throndhjem; but S. Emodi *Wall.* I have only met with near Christiania.

Lime (Tilia europæa *L.*) grows wild in low lands as far north as lat. 62°; but in a cultivated state at least up to lat. 63° 42′. The lime tree in Norway seldom attains a respectable height, as the crown is frequently topped for fodder for the cattle. Yet occasionally, trees may be found in the southern parts of the country 50—55 feet high, with trunks 12—18 feet in circumference, generally hollow inside. At the northern limit for the cultivated lime, specimens may be found 35—42 feet in height with trunks 7—9 feet in circumference.

Misseltoe (Viscum album *L.*) is only to be found on the western shore of the Christiania Fjord, between lat. 59° 25′ 30″ and lat. 59° 29′ 40″, usually on lime or oak.

Mock Orange (Philadelphus coronarius *L.*) common along the coast up to Throndhjem.

Mountain Ash (Sorbus Aucuparia *L.*) grows wild over the whole country up to Finmarken, where the fruit will ripen under lat. 70°. On the mountains it reaches the limit of Birch. The largest stem I have seen is in the southern districts: at one foot above the ground it has a circumference of 7 ft. 3 inches.

Norway Maple (Acer platanoides *L.*) is the only species growing wild in Norway. It is found in low lands as far north as lat. 61½° about; but it grows in a cultivated state near Throndhjem, where its seed will ripen in favourable summers. The largest specimen I have seen in Norway grows in Thelemarken (lat. 59° 25′); it is 62 feet high, and its trunk, measured at breast-height from the ground, is 10 feet in circumference, and its crown has a diameter of 48 feet. This tree is 65—70 years old.

Norway Spruce-Fir (Pinus Abies *L.*) and the Scotch fir constitute the most extensive forests in the south eastern parts of Norway. The Norway Spruce Fir is never or very rarely to be found in these parts; between lat. 63° and lat. 65°, however, it, as well as the Scotch fir, grows almost down to the sea. Forests of this tree appear up to lat. 66½°, but never beyond lat. 67°. A group of the Pinus orientalis *L.* is said to have been found in E. Finmarken lat. 69° 30′, near the Russian frontier. The limit for the spruce fir has, in a few words, been placed as follows: in the southern districts, at an altitude of 2800—3100 ft.; under lat. 62°, at about 2600—2800 ft.; under lat. 64°, at about 1600—1800 ft.; and in Nordland, at barely 800 feet above the sea. The foreign species that I have seen near Christiania are P. balsamea *L.* and P. Picea *L.*, which last is to be found near Throndhjem in a cultivated state.

Oak, common (Qvercus pedunculata *Ehrh.*). This species, which is the most widely disseminated, is always intended when oak generally is referred to. In the eastern districts, it grows wild up to lat. 61°, and to lat. 63° on the west coast. As far as I know, the most northerly cultivated oak in Norway stands at the entrance into the Trondhjem Fjord (lat. 63° 42′ 30″). It is 46 feet high, and the trunk, measured at breast-height from the ground, is 9 feet in circumference; the crown is 56 feet in diameter. The fruit ripens in average summers. When one takes the latitude into consideration, the oak tree may be said to attain a considerable size in the southern districts of Norway. Occasionally, trunks

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measuring 20 feet and more in girth may be met with. Most of these trees have been measured by a friend of mine, Mr. Asbjørnsen, Conservator of public forests, and author of the well-known "Popular Tales, and fairy Legends of Norway." This gentleman has favoured me with the following dimensions of the largest oak-tree in Norway. This tree stands on a farm called Valen in Bergen Stift, on the western coast (lat. 59° 40′). It is perfectly healthy, and is 125 feet high; the trunk, measured at a distance of 3 feet from the ground, is about 26 feet in circumference. A specimen of still larger dimensions had formerly stood at no great distance from it, but had fallen down, several years ago, from the effects of extreme age. The only idea I am able to give of its dimensions is, that 22 persons are said to have taken shelter from a storm within its hollow trunk. The sessile fruited Oak (Q. sessiliflora *L.*) is only found in one district on the south-eastern coast, towards Cape Lindesnæs. It reaches a considerable size, but never becomes so large as the common oak, neither is its timber considered so good for ship-building purposes.

Paulownia imperialis *Sieb. & Zucc.* In the little town of Mandal (lat. 58° 1′) there are two specimens of this tree, which were planted in 1852, when very small. They have never been covered up. The largest has now reached a height of 14 feet, and has a stem 4 inches in diameter. The tops are generally frozen off every winter.

Poplar (Populus). There are many species of this genus in a cultivated state in Norway. The Tacamahac Tree (P. balsamifera *L.*) grows as far north as lat. 68° 35′. Near Throndhjem I have seen large specimens of the Abele Tree (Populus alba *L.*). Near Christiania Lombardy Poplar (P. fastigiata *Desf.*) attains a height of 60—70 feet.

Privet (Ligustrum vulgare *L.*) grows wild on several islands in the Christiania Fjord, and in a cultivated state along the coast up to Throndhjem. It does not require winter covering.

Red Cedar (Juniperus virginiana *L.*) I have only met with near Christiania. It is not covered up during winter.

Rhododendron ponticum *L.* is found growing in gardens in different places. It is occasionally covered up during the winter, but at Throndhjem (lat. 63° 25′) its northern limit, it stands the cold without covering.

Rose (Rosa). Many species are found growing wild as far north as lat. 66°, and numerous species and varieties are cultivated in gardens. The most northerly place, as far as I know, where the common "double garden roses" bloom in favourable summers, is Throndenæs in Finmarken, lat. 69° 49′. In the neighbourhood of Throndhjem the common Moss roses require no winter covering. In the southern districts different varieties of the double yellow, Eglantin, and evergreen roses are to be met with up to Christiania.

Sallow Thorn (Hippophaë rhamnoides *L.*) grows wild, especially in the northern districts up to lat. 67°. In the neighbourhood of Throndhjem it will grow to a height of 14—16 feet, with a stem the thickness of a man's arm in circumference.

Scotch Fir (Pinus sylvestris *L.*) constitutes the largest forests in the eastern districts. The Scotch fir grows over the whole country as far north as E. Finmarken. I have before me a piece of a plank from Alten (lat. 70°) 2 ft. 10 in. in diameter without the bark; it is about 400 years old. On the mountains the Scotch fir attains rather a higher altitude than the spruce fir; the

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limits for its vegetation can, in a few words, be placed as follows: — In the southern districts up to 3150 ft. above the sea

under lat. 62° to 2950 ft.
— lat. 64½° to 1800 ft. (about)
— lat. 68½° to 1300 ft. (about)
and — lat. 70° rarely over 600—700 feet above the sea. Along the south coast I have noticed the foreign species Pinus Laricio austriaca *Antoine*, P. Laricio Pallasiana *Lamb.*, P. Pyrenaica *Lapeyr.*, P. Cembra *L.* and P. Strobus *L.*

Shepherdia canadensis *L.* I have only met with in gardens near Christiania; it requires no winter covering.

Shrubby Trefoil (Ptelea trifoliata *L.*) I have also only met with in the neighbourhood of Christiania, where it attains a height of 8—10 feet with a stem as thick as the arm.

Siberian Crab (Pyrus baccata *L.*) is common in gardens and parks up to lat. 60°, but can undoubtedly thrive much further north.

Siberian Pea Tree (Caragana arborescens *L.*) is found in a cultivated state at least as far north as Throndhjem. Near Christiania there are specimens 20 feet high with stems 16 inches in circumference.

Spindle Tree (Euonymus europæus *L.*) grows wild in the south of Norway, but is very rare. Near Christiania I have seen cultivated specimens 12 feet high with stems 19 inches in circumference.

Spiræa. I have noticed 20 different foreign species in the south of Norway, and as far north as Throndhjem.

Spurge Laurel (Daphne Mezereum *L.*) grows wild in the lowlands up to lat. 67°.

St. Peters Wort (Symphoricarpus vulgaris *Mchx.*) cultivated in gardens up to lat. 68° 35'.

Staff Tree (Celastrus scandens *L.*) I have only seen in the neighbourhood of Christiania, where it is not covered up during the winter.

Sycamore (Acer Pseudoplatanus *L.*) does not grow wild in Norway; in a cultivated state it is found in the neigbourhood of the coast up to lat. 63° 35'.

Tamarisk, German (Tamarix germanica *L.*) grows wild in places as far north as Finmarken, and is sometimes met with in gardens as an ornamental shrub.

Travellers Joy (Clematis Vitalba *L.*) and three other species are found as ornamental plants as far north, at least, as Christiania.

Tulip Tree (Liriodendron tulipifera *L.*) In two places in the neigbourhood of the Christiania Fjord I have met with young trees, that had not as yet flowered.

Venetian Sumach (Rhus Cotinus *L.*) is rare in gardens in the south of Norway — as are R. Toxicodendron *L.*, R. radicans *L.*, R. vernix *L.* and R. elegans *Ait.*

Virginian Hop-Hornbeam (Ostrya virginica *Willd.*) I have only noticed in the Botanical Gardens at Christiania.

Walnut Tree, the black wooded, (Juglans nigra *L.*) is found at different places along the coast, as far north as Throndhjem. In the neighbourhood of Christiania, the fruit of this tree will ripen in average summers. The annual shoots are as much as 3 feet in length.

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Willow (Salix). About thirty species of this genus are found growing wild in Norway. The largest of these, viz. The goat Willow (S. Caprea *L.*), and The bay-leaved Willow (S. pentandra *L.*) may be found growing as far north as Finmarken. Amongst the foreign species, which become trees, and are found in places in the south of Norway, may be mentioned S. alba *L.*, S. fragilis *L.*, S. viminalis *L.* and S. vitellina *L.*

Yew (Taxus baccata *L.*) grows wild in places in lowlands, in the south of Norway, but is not fonnd north of lat. 61°. As is known, the yew is a slow growing tree. I have before me a transverse section from a tree in the neigbourhood of Christiania. It is 8½ inches in diameter, and apparently 254 years old. Some miles south of Bergen there is a yew tree, the trunk of which measures 18 inches in diameter at the bottom, and 7 inches at a distance of 10 feet from the ground. Again, some miles north of Bergen, up to lat. 60° 47′, trees may be found ranging from 25—30 feet in height, and measuring as much as 2 feet in diameter near the root; but they are generally rotten inside.

III. CEREALS.

Barley (Hordeum) The common, or four-rowed barley is most generally cultivated in Norway; it grows as far north as Finmarken, under the seventieth parallel of latitude; and is found at a greater altitude than any other of the Cereals. It should be remarked, that when "barley" is referred to, in Norway, this species is always intended. Under certain circumstances, barley will ripen at the same altitude, as that at which the Norway spruce fir will flourish; but the yield is uncertain, and cannot be calculated upon. Of late years, other species and varieties of barley, as the Himalayan, Peruvian, and naked four-rowed barley, the Fan- Sprat- or Battledore Barley (H. Zeocriton *L.*), the Annat- and Chevalier Barley (H. distichon *L.*) &c., have been cultivated with success, in many places. According to the last Census (1855) barley composed 24,1 pr. cent of the whole corn produce of the country. I have, for several years, made experiments with winter barley, in the neighbourhood of Christiania, and have met with different results, so that I cannot, as yet, give any decided opinion.

Durra (Sorghum vulgare *Pers.*) In the years 1858 and 1859 I cultivated this plant in the Botanical Gardens at Christiania (lat. 59° 54′ 43″), to see whether it would ripen. In 1858 I sowed some seed on May 14th, and the corn ripened Septr. 24th i. e. in 134 days; in 1859 I sowed on May 27th, and it ripened Octr. 5th, i. e. in 132 days; it was 6—7 feet high.

Maize or **Indian Corn** (Zea Mais *L.*) Since 1852, I have made numerous experiments in the Botanical Gardens at Christiania, with a number (50 - 60) of the so-called varieties of maize, which have led to very interesting results. Space, however, forbids me entering into details, so that I take the liberty of referring to my above-named treatise, "*Die Culturpflanzen Norwegens*", contenting myself with making only one or two brief remarks. The shortest time, in

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which I have succeed in getting maize ("Yellow Chicken-Corn") ripe, is 85 days, inclusive of 2 days which were taken up in sowing and in harvesting; and the longest time, according to the same calculation that any sort ("Tuscarora- and Sugar Corn") has taken, has been from 144—145 days. Twentyfour varieties have, on an average, taken 114 days from the time of sowing to that of harvesting. The greatest height any sort ("Horse tooth Corn") has attained here, is 15 feet. Notwithstanding these results, it would by no means be expedient to cultivate maize in Norway, for the sake of the grain. In some places it might, perhaps, answer to cultivate some of the larger varieties for green food.

Millet, common (Panicum miliaceum *L.*) For several years I have made experiments with 6 different varieties at Christiania, viz. black, brown, grey, red, yellow and whiteseeded millet. These sorts require on an average from 106—120 days for their full development; they ripen in the above order; the dark-grained varieties thus ripening first, and the light ones last. In average summers, millet ripens as far north as Throndhjem, and might, I believe, be cultivated advantageously in places.

I have also made several experiments with different varieties of the Italian Millet (Setaria italica *Pal. B.*) and the German Millet (S. germanica *Pal. B.*); these have required from 130—140 days to ripen, reckoning from the day of sowing.

Oat (Avena). The Tartarian Oat (Avena orientalis *Schreb.*) is found sometimes, but is very rare; also the common naked Oat (A. nuda *L.*); but when oats are spoken of in Norway, the common oat (A. sativa *L.*) is intended. The most northerly spot, where I have seen samples of field-cultivated oats, is on Dyrø island, Finmarken (lat. 69° 3′). Oats are the most generally cultivated grain in Norway; and, according to the last Census, composed 55,8 pr. cent, of the whole corn produce of the country. Of late years it has, however, been superseded by the more valuable sorts of grain. Oats are certainly used for horses, but by far the greatest quantity is employed for human food, partly in a peculiar sort of unfermented bread, partly in porridge eaten with milk. Nearly over the whole country a mixture of barley and oats is cultivated, known by the name of "mixed corn". It is ground together, and is used in the country districts for bread, and for the above-named porridge. According to the last Census, this mixed corn composed 14 pr. cent of the whole corn produce of the country. Formerly, in years of scarcity in Norway, it was not unusual to mix oatmeal or other meal with the bark of certain trees; but this custom is much less general now and is, in fact, becoming every day a greater rarity.

Rye (Secale) is cultivated both as summer and as winter corn, the last, however, being most general. The most northerly latitude, under which I have met with specimens of summer rye, is lat. 69° 3′, and of winter rye, lat. 69° 34′. According to the last Census, rye composed 4,7 pr. cent of the whole corn produce of the country.

Wheat (Triticum). Different sorts of summer and winter wheat are cultivated, principally allied to the common Wheat (T. vulgare *L.*) Near the little town of Bodø (lat. 67° 17′) there is an Agricultural School, probably the most northern in the world. In 1860 an experiment was made with growing summer wheat; it ripened in 120 days from the time of sowing! According to official reports, wheat has not hitherto been cultivated

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on fields, further north than lat. 64° 40′. According to the last Census, it composed 1,4 pr. cent of the whole corn produce of the country. Of late years this grain has been more extensively cultivated.

IV. OTHER PLANTS CULTIVATED FOR ECONOMICAL PURPOSES.

Angelica (Archangelica officinalis *Hoffm.*) grows wild over the whole country as far north as Finmarken. In mountainous districts, it is found beyond the limit of Birch. In olden times, it used to be extensively cultivated, but is rarely seen now in a cultivated state.

Anise (Pimpinella Anisum *L.*) is occasionally cultivated in gardens, as a curiosity. The most northerly place where I have met with samples of ripe anise, was in Finmarken, lat. 68° 40′ 30″.

Artichoke (Cynara Scolymus *L.*) is cultivated in places, as far north as Throndhjem.

Asparagus (Asparagus officinalis *L.*) is common in a cultivated state, as far north as Throndhjem, at least. There is every reason to suppose, that it can be cultivated as far north as any of the Cereals.

Balm (Melissa officinalis *L.*) is cultivated in places, in the southern districts.

Basil (Ocimum Basilicum *L.*) is rather common, as far north as Throndhjem, at least.

Bean (Vicia Faba *L.*) is cultivated in several places, but not to the extent it deserves. In average summers, it will ripen as far north as Værdalen, (lat. 63° 47′); and in Hallingdal, in the south of Norway, it is found at a height of 2,200 feet above the sea. It is a somewhat curious fact that, in 1860, ripe beans were obtained at the Agricultural school at Bodø (lat. 67° 17′) referred to above. In the Botanical Gardens at Christiania, I have, by way of experiment, cultivated about 25 varieties, but my attempts with the winter bean have proved a total failure.

Borage (Borago officinalis *L.*) I have seen in different places in the south of Norway under cultivation; it readily propagates itself as a weed.

Cabbage Tribe.

Borecole (Brassica aleracea acephala *DC.*) is cultivated over the whole country, even to the shores of the Varanger Fjord, E. Finmarken, (lat. 70° 7′, long. 29° E.) where it will attain a height of 9—10 inches, with a head in proportion, though not planted out, but raised from seed on fields, in the open air. The Cow Cabbage has, of late years, been cultivated in several places, as green food; and, in Bergen Stift, has yielded as much as a little over 40 tons pr. English acre.

Brocoli (B. ol. botrytis asparagoides *DC.*) I have only on two occasions met with in a cultivated state, near Christiania.

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Brussels Sprouts (B. ol. bullata gemmifera *DC.*) is very common nearly over the whole of Norway. In warm summers, it will come to maturity even at Tromsø (lat. 69° 39′).

Cauliflower (B. ol. botrytis cauliflora *DC.*) stands an unfavourable climate far better than is generally supposed. Even in Alten (lat. 70°) it seldom fails; and in Throndenæs, (lat. 68° 49′), regular supplies are got from plants, raised from seed in the open fields.

Drumhead White Cabbage (B. ol. capitata depressa *DC.*). Of all the plants belonging to this tribe this one is the most generally cultivated. I am, however, unable to give its northern limit, with any degree of accuracy. At my annual Exhibitions in Chsistiania, I have had cabbages from lat. 64°, weighing 17 ℔s; but I am of opinion, that it would not answer to grow this plant beyond the Polar Circle. The largest cabbage I have seen in Christiania, weighed 30 ℔s. On an English acre, abouth 10,000 plants are generally planted out, which, in the neigbourhood of Christiania, produce, on an average, about 40 tons per acre.

Kohl-Rabi (B. ol. Caulo-Rapa *DC.*). Different varieties are cultivated as far north as the Polar Circle, at least.

Rape, Summer- and Winter- (B. Napus oleifera annua & biennis *Metzger*) and Turnip Rape, Summer- and Winter- (B. Rapa oleifera annua & biennis *Metzger*) I have grown by way of experiment in the Botanical Gardens at Christiania, where they have all yielded ripe seed. When the ground becomes frozen in the autumn, and a fall of snow subsequently takes place and remains lying, the winter varieties will stand the winter very well; but, should the snow come before the frost, and the winter be changeable, with snow and rain, they will, generally, die. None of the above-named, or of other oil-yielding plants are cultivated in Norway.

Red Cabbage (B. ol. capitata rubra *DC.*) is cultivated up to the Polar Circle, about.

Savoy (B. ol. bullata *DC.*) is cultivated about up to lat. 64°, or perhaps a little further north, the specimens which I have seen from Finmarken were not much larger than a man's fist.

Swedish Turnip (B. Napus rapifera *Metzger*) is very general over the whole country; in Finmarken under lat. 70° it grows to a rather large size than the American Fall Pippin. The largest root I have seen near Christiania weighed 18 ℔s. The field cultivation of this plant would not be remunerative beyond the Polar Circle; though, in 1860, at Bodø (lat. 67° 17′) a crop of 14½ tons to the acre was obtained. In the south of Norway this is about the average crop per acre, exclusive of about 5 tons of leaves; but, under favourable circumstances this amount is often doubled.

Turnip (B. Rapa rapifera *Metzger)* is deservedly the most popular of all the cultivated plants in Norway, there scarcely being an inhabited spot, where turnips of some kind or other are not known, and cultivated. On the Dovrefjeld, (lat. 62½°) at an altitude of 3,000 feet above the sea, I have seen turnips double the size of a man's fist; and even on the extreme borders of Finmarken a truly surprizing crop may be obtained.

A gentlemen, who for several years has been chaplain at the little fortress of Vardøhus (lat. 70° 22′ 35″), a place which, as is known, lies exposed to the storms of

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the Arctic Ocean, and to extremely severe weather, has informed me, that he could reckon on getting a crop of 8½ tons to the acre, taking one year with another. At Bodø in 1860 a crop af 17½ tons to the acre was obtained. In the south of Norway, the average crop may be estimated at 17½ tons, and a little over 5 tons of tops, per acre. Occasionally, crops of 22—25 tons per acre may be heard of; and it is reported that crops of 50 tons per acre have been known.

Turnips up to 20 ℔s are tolerably common, in the southern districts; the largest one that I have known of in the neighbourhood of Christiania weighed 29 ℔s. I have ripe seed, which was gathered in Finmarken in lat. 69° 34′, long. E. Ferro 37° 53′.

York Cabbage (B. ol. capitata obovata *DC.*). The same may be said of this plant as of the Savoy.

Canary Grass (Phalaris canariensis *L.*) is cultivated here and there in gardens, as a curiosity. The seed will ripen at least as far north as Throndhjem.

Caraway (Carum Carvi *L.*) grows wild over the whole country, as far north as Finmarken. On the mountains, its limit is intermediate to that of the Scotch fir and birch. Some years ago, I began to cultivate caraway in the Botanical Gardens at Christiania, with an aim to develop the root, which, after 4 years cultivation, attained such a size as to weigh 2½ ounces. At the present time, caraway is not cultivated in Norway; but, I believe that it may be grown advantageously in many places for the sake of its seed.

Cardoon (Cynara Cardunculus *L.*) is cultivated at certain places as for north as Throndhjem.

Carrot (Daucus Carota *L.*) is cultivated over the whole country, but diminishes in size the farther north it is found. The largest specimen which I have had for my annual exhibition from Fort Vardøhus on the Arctic Ocean, weighed 2½ ounces; but I have had carrots from Throndenæs, in Finmarken, (lat. 68° 49′) weighing 10½ ounces; and from the neighbourhood of Christiania, as much as 4 ℔s. The average crop in the south of Norway may be estimated at 10 tons per acre, though instances are not wanting, where more than double this amount has been obtained.

Celery (Apium graveolens *L.*). Under this name, in Norway, the turnip-rooted celery is understood, which, with but few exceptions, is the only sort that is cultivated in the country. The roots I have seen from Alten have never been larger than a common hen's egg; but in the neighbourhood of Christiania they will attain a weight of 1½ ℔s. In average summers the seed ripens at Throndhjem.

Chervil (Anthriscus cerefolium *Hoffm.*) is cultivated as far north as Finmarken. The seed will ripen at Throndhjem.

Chicory (Cichorium Intybus *L.*) grows wild in places in the southern districts, and is occasionally used as a miserable substitute for coffee. The seed will ripen at Throndhjem.

Chick Pea (Cicer arietinum *L.*) I have only met with in the neigbourhood of Christiania, where the seed will ripen.

Chive (Allium Schoenoprasum *L.*) is to be found in every plot of garden ground up to Finmarken.

Ciboule or **Welsh Onion** (Allium fistulosum *L.*) is grown in places up to Throndhjem.

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Clover. The red, white and Alsike Clover (Trifolium pratense, repens & hybridum *L.*) are to be found both wild and in a cultivated state nearly everywhere in the lowlands. The crimson Clover (T. incarnatum *L.*) has of late years been grown with success in the neighbourhood of Christiania.

Cocks-foot grass (Dactylis glomerata *L.*) grows wild in low lands as far north as Finmarken, and is sometimes cultivated on suitable soils.

Coriander (Coriandrum sativum *L.*) is rarely cultivated in gardens. Near Christiania the seed ripens, towards the end of August. I have by me seed which was grown in Finmarken, lat. 68° 40′ 30″.

Corn-salad (Valerianella olitoria *Mønch*) grows wild in places on the south-eastern coast, but is not cultivated in Norway.

Cucumber (Cucumis sativus *L.*). In average summers, cucumbers can be grown in the open field as far north as Throndhjem. At Christiania, the seeds of the earlier sorts, when grown in this manner, will ripen. In Finmarken up to lat. 70, they may be grown in common hot-beds.

Cumin (Cuminum Cyminum *L.*). From experiments I have made at Christiania, I have found that the seed ripens from the middle till towards the end of September. This plant is not cultivated.

Dill (Anethum graveolens *L.*) is grown as far north as Finmarken; the seed ripens at Throndhjem.

Egg plant (Solanum Melongena *L.*) is grown occasionally, as a curiosity, in hot-beds. From an experiment I made near Christiania, in the beginning of June, of planting out small specimens (each with 3—4 leaves) in the open field, but sheltered from the north, I succeeded in obtaining 2—3 ripe fruits on each plant of the white and purple varieties, before the end of September.

Endive (Cichorium Endivia *L.*) is cultivated as far north, at least, as Throndhjem.

Flax (Linum usitatissimum *L.*). The cultivation of flax in Norway is probably as old as the cultivation of corn; at all events, it dates as far back as the Pagan times before the year 1000. Flax is to be met with up to the Polar Circle, at least; and perhaps, even farther north, but only in small quantities. The cultivation of flax, owing to various causes, is attended to less and less every year. By degrees, as country people began to manage their households in a more rational manner, it was found that it was unprofitable to cultivate the flax plant, probably because much cheaper stuffs could be obtained from cotton. On the whole, it may be said as a general rule, that those plants, which are cultivated for their uses in the arts and manufactures, do not occupy any significant place in Norwegian agriculture, except perhaps, in the vicinity of towns, where ground is valuable, and where there are greater facilities for obtaining the requisite quantity of manure. But as long as Norway has to import a considerable quantity of bread-corn, it would, as a rule, be improper to grow other plants than those, which are absolutely necessary to the sustenance of animal life, and at the same time essential in re-invigorating the soil.

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Fox-tail Grass (Alopecurus pratensis *L.*) is found growing wild, especially along the coasts as high up as the Polar Circle, and is sometimes cultivated on suitable soil.

Garden Cress (Lepidium sativum *L.*) is cultivated, and the seed ripens, wherever garden-cultivation is carried on in Norway.

Garden Orach (Atriplex hortensis *L.*) is cultivated over all the country as far north as Finmarken. The seed will ripen as high up as Throndhjem at least.

Garden Patience (Rumex Patientia *L.*). The remarks on the foregoing plant are applicable to this.

Garlic (Allium sativum *L.*) is rarely grown, but is to be found at least as for north as Throndhjem.

Gold of Pleasure (Camelina sativa *Crtz.*) grows wild, or is found as a naturalized straggler in the southern districts, but is not cultivated. Near Christiania the seed ripens in August.

Gourd or **Pumpkin** (Cucurbita Pepo *L.*). Many varieties of this plant are grown both in hot-beds, and on the open fields. I have seen pumpkins from Throndhjem, grown out of doors, weighing 40 ℔s; and seed, ripened under lat. 64° 5′. The largest pumpkin I have seen at Christiania, and which was grown on a compost heap, weighed 120 ℔s. Several varieties of Bottle Gourds (Lagenaria vulgaris *Ser.*) are grown in hot-beds, as curiosities.

Guinea Pepper (Capsicum annuum *L.*). Young plants, treated in the same way as the Egg plant, will produce ripe fruit before the end of September.

Hemp (Cannabis sativa *L.*). Scarcely any plant occupies a smaller space than this in Norwegian agriculture, owing in a great measure to the same causes alluded to above under the head of Flax. Hemp is, however, occasionally cultivated as far north as lat. 67°.

Hop (Humulus Lupulus *L.*) grows wild in lowlands up to the Polar Circle; but is cultivated only to a very small extent. Of late, however, an increasing interest has been evinced in its cultivation.

Horse Radish (Cochlearia Armoracia *L.*) is common in a cultivated state up to the Polar Circle, and probably farther north. Near Christiania, when cultivated as an annual, the root (which varies from 12 to 18 inches in length) will weigh from ½ ℔ to 1 ℔. I have received roots from Throndhjem, grown in this manner, weighing 13 ounces.

Hyssop (Hyssopus officinalis *L.*) is cultivated in places as far north, at least, as Throndhjem. The seed will ripen at Christiania.

Indian Cress or **Nasturtium** (Tropæolum majus *L.*) is very common; the unripe seeds are used as pickles. It will ripen at Throndhjem.

Jerusalem Artichoke (Helianthus tuberosus *L.*) is cultivated in places as far north, at least, as Throndhjem. It was much more common at the end of the last and the beginning of the present century; but is now, for the most part, superseded by the potato.

Kidney Bean (Phaseolus). The great importance attached to the numerous plants of this natural order, as constituting food for man and beast, has led me to take an especial interest in my experiments with the Kidney Bean tribe. Many sorts of Kidney Beans, chiefly of the dwarf varieties, will ripen in average summers as far north as Throndhjem, lat. 63° 25′, as, indeed, will several of the running varieties, which generally require a longer time. Of

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the former, may be mentioned Ph. sphæricus nanus *Mart.*, Ph. vulgaris nigerrimus *Zuccagni*, Ph. oblongus vinosus *DC.*, Ph. oblongus spadiceus *Savi*, Ph. obl. purpureovariegatus *Mart.*, Ph. obl. Sargentone *Savi*, Ph. obl. zebrinus *Mart.*, Ph. obl. Rachelianus *Mart.*, Ph. obl. saponaceus *Savi*, Ph. obl. alboruber *Savi*, Ph. ellipticus *Savi* and Ph. ell. aureus *Zuccagni*. Of the latter, may be mentioned Ph. ceratonoides *Schrank*, Ph. compressus macrocarpus *Mart.* and Ph. ellipticus saccharatus *Mœnch*. Near Christiania I have succeeded in ripening about 100 species and varieties of Kidney Beans.

Lavender (Lavandula Spica *L.*) is very common in gardens as far north as Throndhjem at least.

Leek (Allium Porrum *L.*) is common in a cultivated state. I cannot give its northern limit with any degree of accuracy. The leek becomes as fully developed near Christiania as any I have seen in other countries; but it does not attain its full size at Throndhjem.

Lentil (Ervum Lens *L.*) is not cultivated in fields, and is rare in gardens. I have grown 4—5 varieties near Christiania, which have ripened by the middle of September. Throndhjem is the most northerly place from which I have had specimens of the lentil. Winter-Lentils have some years done well near Christiania, and in others have not succeeded.

Lettuce (Lactuca sativa *L.*) Numerous varieties of lettuce are cultivated as far to the north, and to as great an altitude above the sea as is compatible with the abode of man. The seed will ripen at Throndhjem.

Lucerne (Medicago sativa *L.*) has been cultivated in several places in the south of Norway as an experiment, with various results. Near Christiania, the seed will ripen, and the plant will endure the winter when the ground is constantly covered with snow; should there, however, be little or no snow, it is destroyed to a greater or less degree. Yellow Lucerne (M. falcata *L.*) stands all changes of temperature, and has proved itself to be a useful and valuable agricultural plant.

Madia sativa *Molin.* I am not aware of any other experiments having been attempted with this plant than those I have made at the Botanical Gardens, near Christiania. The seed generally ripens by the middle of September.

Mangel Wurzel (Beta vulgaris rapacea *Koch*) has of late years been grown in places in the south of Norway with different success. The largest crop that I have heard of is 15½ tons of roots, and of 7¾ tons of leaves to the acre; the largest root weighing 7½ ℔s.

Marjoram (Origanum Majorana *L.*) is common in kitchen gardens up to lat. 68° 49 in Finmarken.

Melon (Cucumis Melo *L.*) is generally grown in hot-beds. Melons grown in this manner at Christiania will attain a weight of 16½ ℔s, and of 6–8 ℔s at Throndhjem. Of late years in the neighbourhood of Christiania people have begun to grow melons out of doors, — using horse dung or some other heating compost as a substratum — either rearing them from seed directly, or transplanting young plants, having 3—4 leaves, from hot-beds. If this last method be adopted during the latter part of May, melons, of 6—7 ℔s each, may be gathered before the end of August.

Mint (Mentha piperita *L.* & M. crispa *L.*) are cultivated at places in the southern districts.

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Mustard (Sinapis alba & nigra *L.*) will ripen near Christiania by the middle of September, but are not cultivated for economical purposes.

New Zealand Spinach (Tetragonia expansa *L.*) I have only seen near Christiania, where its seed can hardly be said to ripen.

Onion (Allium Cepa *L.*) is cultivated over the whole country as far north as Finmarken. I have had onions from lat. 68½ as large as the common golden Pippin. The largest onion I have seen at Christiania weighed 1 ℔. The seed will ripen as far north as Throndhjem.

Parsley (Petroselinum sativum *Hoffm.*) Several varieties of the curled and of the so-called Hamburg Parsley are grown in most places. I have had roots weighing 3–3½ ounces from Finmarken, and as much as 2 ℔s from the neighbourhood of Christiania. The seed will ripen as high up as Throndhjem.

Parsnip (Pastinaca sativa *L.*). Of this plant we have also many varieties. Roots from Finmarken, lat. 68° 49′, have weighed as much as 4½—5 ounces; the largest I have met with near Christiania weighed 2½ ℔s. Of late years, experiments have been made in cultivating parsnips for fodder. The average crops in the southern districts may be estimated at 9½ tons pr. acre. The seed will ripen at least as far north as Throndhjem.

Pea (Pisum). The Field Pea most generally cultivated in Norway, is the Pisum arvense *Schüb.*; and indeed this variety is always inferred when Gray Field Peas are spoken of. In average summers it will ripen as far north as lat. 64°. It is, however, cultivated farther north, and will occasionally ripen — I have by me a specimen from the Agricultural School at Bodø, lat 67° 17′ – otherwise it is cut for green food. Varieties of the yellow pea are now and then cultivated; and within the last few years the field-cultivation of the blue Prussian Pea, in the southern districts (up to lat. 60° 40′ at least), has proved to be extremely profitable. Many different varieties of the Sugar and common garden Peas, but principally of the latter, are grown in gardens. One of these latter, called by the Germans "Buxbaum"-Pea, I have had ripen twice in the same summer; and in 1860, this variety ripened in Alten lat. 70°. All my endeavours to cultivate the Winter Peas near Christiania have been fruitless.

Poppy (Papaver somniferum *L.*) I have cultivated the white and gray varieties for several years in the neighbourhood of Christiania; they have ripened by the middle of September: an excellent salad oil was extracted from the seeds.

Potato (Solanum tuberosum *L.*) can be grown at rather a greater altitude than barley, and at many places in Finmarken where the latter will not ripen. The potato was imported into Norway from Great Britain, about the middle of the last century. The potato disease, which is so generally prevalent, has not, as far as I know, appeared above the 64th parallel of latitude.

Purslane (Partulaca oleracea *L.*) is grown in all kitchen gardens, and readily propagates itself as a weed. The seed ripens at least as far north as Throndhjem.

Quinoa Spinach (Chenopodium Quinoa *L.*). I have grown this plant for several years in the neighbourhood of Christiania, where it attains a height of 5—6 feet; on an average it has taken 144 days for the seed to ripen.

Radish (Raphanus sativus *L.*). The common summer, autumn and winter varieties are

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cultivated even up to the Russian frontiers on the Arctic Ocean. A man, who lives on the northern shore of the Varanger Fjord, E. Finmarken, and who annually grows from 2—300 lbs of winter radishes, has assured me that they will usually attain the size of a "common coffee cup."

Rhubarb (Rheum). Several species and varieties of rhubarb are grown as far north as lat. 70°, in W. Finmarken, where the seed will ripen, and the stalks, under proper cultivation, attain the same dimensions as in other places.

Rocambole (Allium Scorodoprasum *L.*) grows wild in the south of Norway, but is very rare. I am not aware of its having been cultivated.

Rye Grass (Lolium perenne *L.*) grows wild, or is found as a naturalized straggler at different places in the south of Norway. It is cultivated at several places on the western coast, where it thrives; but in the eastern districts, where the cold is far more severe, it has not been found to answer. The Italian Rye Grass (Lolium italicum *A. Br.*). This plant has lately begun to be cultivated; but with what success, the little information I have received does not permit me to draw any conclusion.

Safflower (Carthamus tinctorius *L.*) is cultivated occasionally as an ornamental plant, but not for manufacturing purposes. Near Christiania, when sown during the latter part of May, the seed will ripen before the end of September.

Sage (Salvia officinalis *L.*) is cultivated as far north as the Polar Circle at least, and perhaps farther. The seed ripens at Christiania.

Sainfoin (Onobrychis sativa *Lam.*). From the few attempts that have been made to cultivate this plant in the southern districts, it appears to stand the winter better than Lucerne; the seed also ripens earlier.

Salsafie (Tragopogon porrifolius *L.*) is cultivated as far north as Alten in Finmarken, lat. 70°, whence I have had roots 6—7 inches in length, and about the thickness of a finger. The seed will ripen at Throndhjem.

Savory (Satureja hortensis *L.*) is common up to Finmarken (lat. 68° 49′). The seed will ripen at Christiania.

Scarlet Runner (Phaseolus multiflorus *Lam.*) is the earliest of all the running varieties of this genus, and best endures the severity of the climate. There is no doubt that it can ripen north of Throndhjem, but information on this point is deficient.

Scorsonera (Scorzonera hispanica *L.*). As the seed of this plant ripens under lat. 64°, it can undoubtedly be cultivated much farther north.

Scurvy Grass (Cochlearia officinalis *L.*) grows wild along the whole sea-coast, but is seldom cultivated.

Shalot (Allium ascalonicum *L.*) thrives perfectly up to Bodø (lat. 67° 17′), and probably farther north.

Skirret (Sium Sisarum *L.*). I have only seen this plant under cultivation near Christiania, where the seed will ripen.

Spinach (Spinacia oleracea *L.*) is cultivated over the whole country as far north as lat. 70°. The seed will ripen at Throndhjem.

Sunflower (Helianthus annuus *L.*) is cultivated as an ornamental plant as far north as

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Throndhjem at least. In Christiania it will attain the height of 8—9 feet, and the flower-heads will occasionally have a diameter of 15 inches. It is not cultivated for economical purposes.

Sweet cicely (Myrrhis odorata *Scop.*) is rarely cultivated. Occasionally it is found as a naturalized straggler in the neighbourhood of Christiania.

Tare, common, (Vicia sativa *L.*) is very generally cultivated as far north at least as the Polar Circle. In average summers the seed will ripen at Throndhjem. Of late years, the white-flowered, or Hopetoun-Tare (Vicia sativa flore albo) has been cultivated at several places. From experiments I have made with this plant, I find that it will ripen quite as early, and yield almost double the amount of green food, as the common tare. Of the other sorts which I have cultivated, I must decidedly give the preference to V. peregrina *L.*, with respect to quantity of green food; but the seed is late in ripening. I have also grown the white-seeded Tare, or Lentil of Canada (V. leucosperma *Willd.,* V. sativa leucosperma *Ser.*) for an experiment; it ripens a week or two earlier than the common Tare, and produces about the same quantity of green food. In addition to this it may be remarked, that I have ascertained by repeated trials, that the seed has a much finer flavour than peas, when it is used in soups and in many other dishes. In average summers this variety will ripen at Throndhjem.

Tarragon (Artemisia Dracunculus *L.*) is cultivated in places as far north as Throndhjem.

Teasle (Dipsacus Fullonum *L.*) is not grown in Norway. The small quantity employed in our limited number of manufactories is imported from France. I have grown this plant in the Botanical Gardens near Christiania, where the seed has ripened about the middle of September.

Thyme (Thymus vulgaris *L.*) is one of our most common herbs; it is grown at least up to lat. 68½, and probably farther north. The seed will ripen at Throndhjem. The wild thyme, (Th. serpyllum *L.*) which grows as far north as Finmarken, is used in some places.

Timothy Grass (Phleum pratense *L.*) grows wild in lowlands up to about lat. 69½°; it is very generally cultivated. At Christiania I have for several consecutive years succeeded in obtaining ripe seed twice in the course of the summer.

Tobacco (Nicotiana Tabacum *L.*). A generation or two ago, it was by no means a rarity for tobacco to be cultivated in this country; and it may to this very day be found in places, but only as a curiosity. In average summers near Christiania the leaves will attain that state of development which is termed maturity. Its peculiar properties, however, owing probably to deficiency of heat, are so imperfectly developed, as to render it perfectly useless for smoking purposes. Flowering plants near Christianis grow to a height of 5—6 feet, and I have had leaves from them as much as 25—26 inches in length, and 13—14 inches in breadth. The seed will ripen at Christiania in average summers.

Tomato (Solanum Lycopersicum *L.*) is grown in hot-beds at several places in the southern districts. I have planted out small specimens towards the end of the month of May in the open air, which have borne as many as 6 perfect fruits, weighing from 5—7½ ounces each. Even plants sown out of doors at the end of May have borne ripe fruit by the end of September. I have frequently tried to get the Tomato to grow by herbaceous grafting on the common potato; but as soon as the fruit has begun to develop itself it has withered.

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Turnip rooted Chervil (Chærophyllum bulbosum *L.*) is not found wild in Norway. I introduced it into this country in 1850, and it is now cultivated at different places in the southern districts. Near Christiania, the seed ripens about the middle of August. The largest roots I have seen here weighed 2½ ounces. It is an excellent root, and is worthy of general propagation.

Water Melon (Citrullus vulgaris *Schrad.*) is seldom grown in hot-beds. The largest ripe fruit I have seen near Christiania weighed only 12 ℔s.

Weld (Reseda luteola *L.*) is not cultivated in this country. I have ascertained by experiments, that summer and winter Weld will thrive in the neighbourhood of Christiania.

Winged Pea (Lotus tetragonolobus *L.*) is cultivated in places; the young green pods are used as salad. The seed ripens as far north as lat. 65½°.

Woad, dyers, (Isatis tinctoria *L.*) is not cultivated in Norway. The experiments I have attempted with this plant have shown that it will thrive in the neighbourhood of Christiania, where the seed ripens in August.

Wood Sorrel, tuberous rooted, (Oxalis tetraphylla *Cav.,* O. esculenta *L.* and O. Deppei *Lodd.*) I have only met with under cultivation in the southern districts, where they are grown partly as an ornamental plant, and partly for the sake of their roots and leaves, which last are used as an addition to spinach. The largest roots I have seen weighed 2 ounces.

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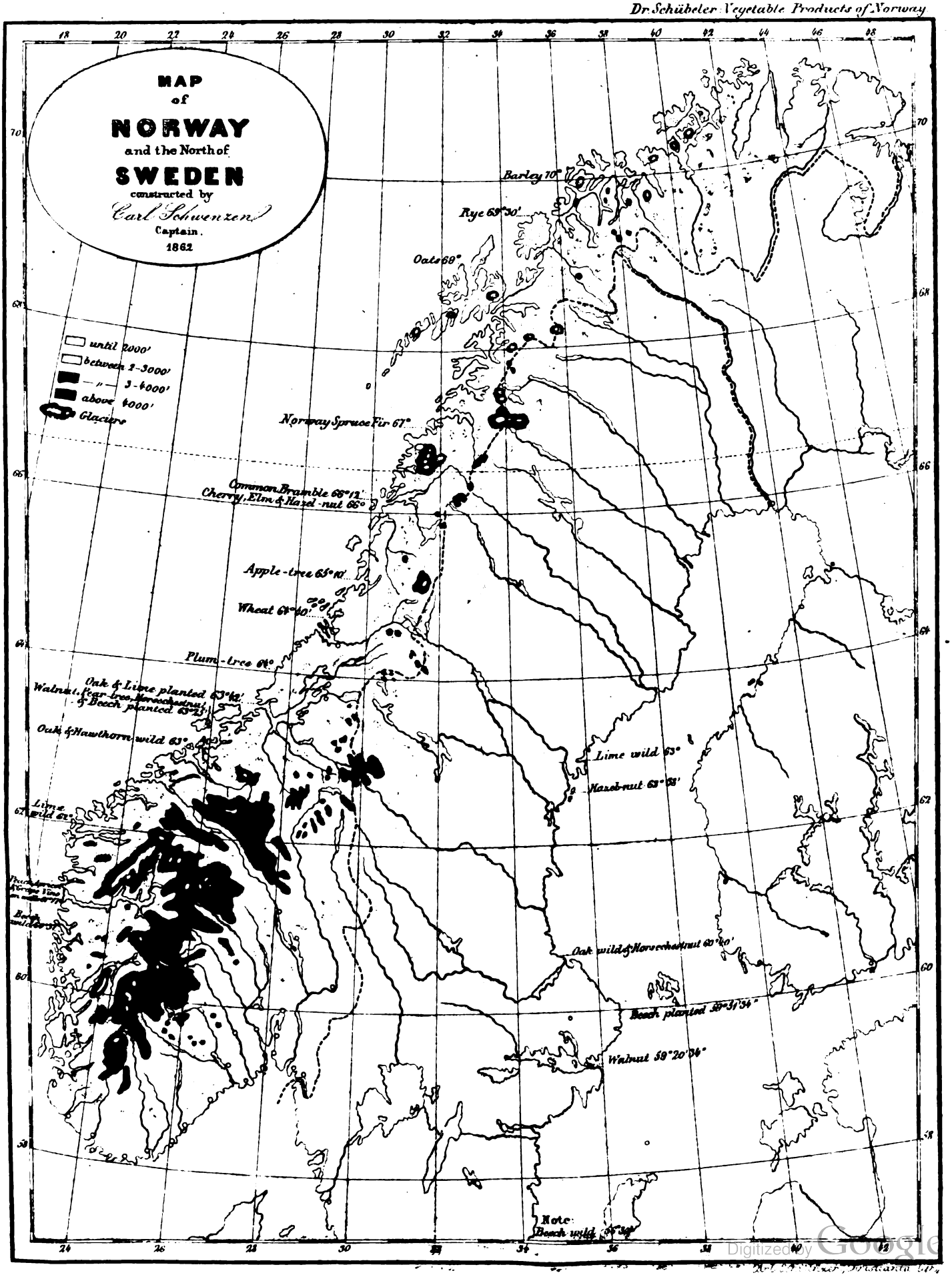

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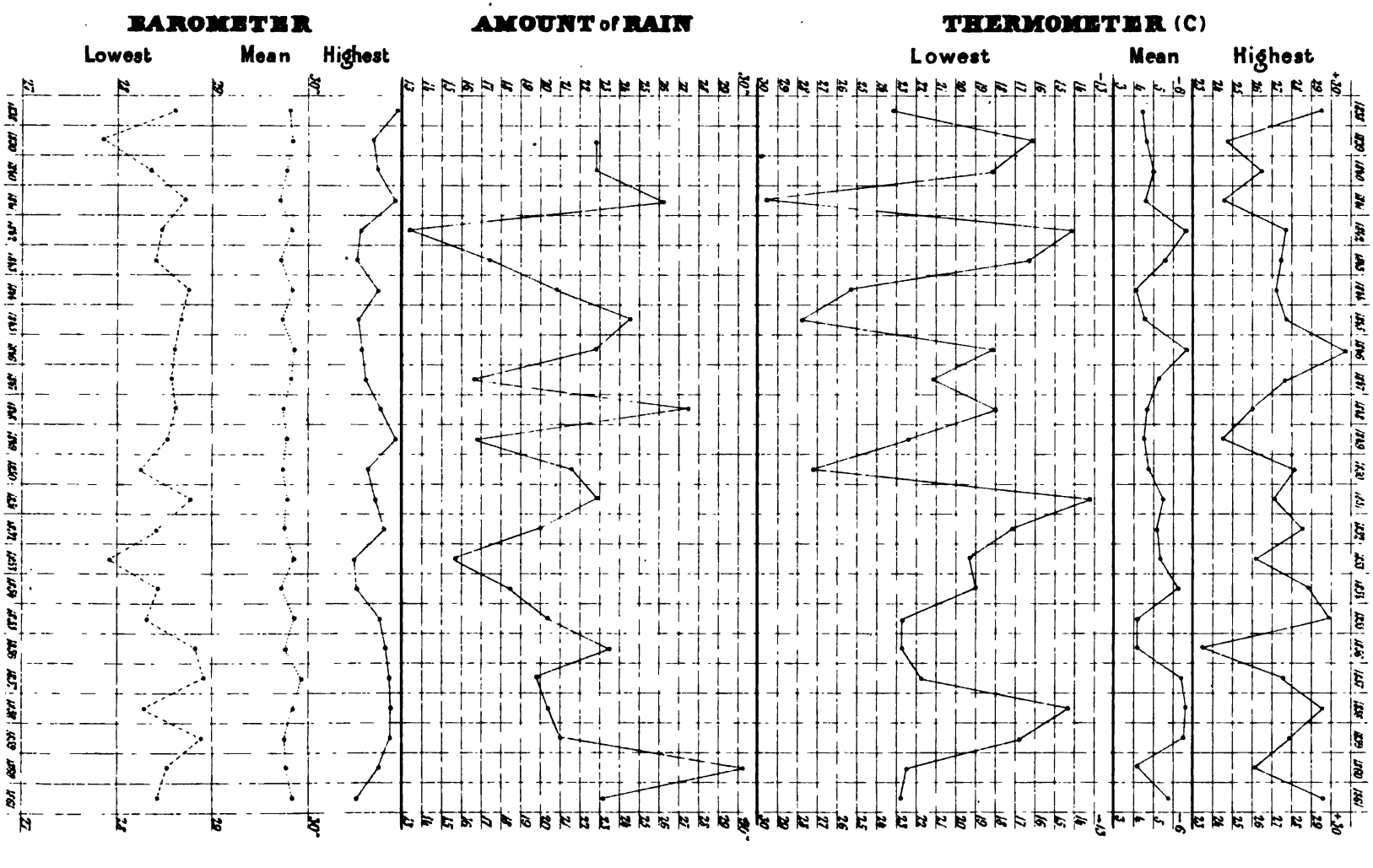
METEOROLOGICAL OBSERVATIONS MADE in CHRISTIANIA (59° 54' 43" 7 N.L.)



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